

## A SWIVEL

### Technical Field

5       The present invention relates to a swivel comprising two coaxial, mutually rotatable members and having means for transferring operating and/or controlling media or the like between the members.

### Background of the Invention

10       A typical use for a swivel of the above type is in an industrial robot, and the invention will be exemplified by reference to this use. However, the invention is not so limited; it may be utilized in many applications within the scope of the appended claims.

15       In a swivel media like compressed air, cooling liquid, lubricant, electric power, and/or control signals, i e generally fluids and or electricity, are to be transferred between the two coaxial, mutually rotatable members.

20       With regard to fluid transfer the two members are rotating against each other, and the cooperating surfaces of the members are provided with mutually corresponding circular grooves, so that fluid may be transferred from one member to the other irrespective of their mutual angular  
25       position. A known problem with this type is the sealing between the members and around the grooves.

      Electric transfer may be provided by slip ring devices in or at the swivel. These devices, which are separate from the fluid transfer, are susceptible of wear  
30       and negative influences of dirt, dust and the like.

      A swivel of this type is relatively complicated and therefore time-consuming and expensive to manufacture. In spite of this the number of different fluids that can be transferred is limited.

Due to the complicated construction it is difficult to service the device, and the life-span is relatively short.

#### **The Invention**

5       The problems and disadvantages with previous swivels is according to the invention removed in that said means are flexible hoses or cables between the members.

      The length of the hoses or cables is chosen so as to allow the desired mutual rotation of the two swivel  
10 members, normally not exceeding a full revolution.

      It may be of advantage if the hoses or cables are elastically extensible, preferably of spiral type.

      By the invention a simpler and cheaper design is obtained. The fluids and the electricity are transferred by  
15 principally the same devices, which means that the service is greatly simplified and the service time shortened. Besides, the over-all life-span is greatly improved.

      The exchange of possibly damaged hoses or cables is facilitated by the use of quick-couplings for them in the  
20 members.

      The number of fluids and signals that can be transferred can be increased in the design according to the invention. This may be of importance for example at the use of industrial robots in foundries, where for example  
25 cooling liquid and lubricant may have to be transferred in the swivel connector. A marked productivity increase may result.

#### **Brief Description of the Drawing**

      The invention will be described in further detail  
30 below under reference to the accompanying drawing, in which

      Fig 1 is cross section through a swivel, for example for an industrial robot, and

      Fig 2 is a plan view of this swivel.

### Detailed Description of a Preferred Embodiment

A swivel for example for an industrial robot is shown in the drawing.

A central shaft 1 is attached to a base plate 2, which has screw holes 3 for its mounting to further parts (not shown) of the robot.

A lower connection ring 4 is rotatably journaled in relation to the shaft 1 by means of a bearing 5, held in position by a spring ring 6.

A cover 7 forming an upper connection is attached to the shaft 1 by means of a central screw 8. Alternatively, a quick-coupling may be used for this purpose, which is an advantage in a service situation. The angular position of the cover 7 in relation to the shaft 1 can be set by a pin 9 in corresponding holes in the shaft 1 and the cover 7.

The cover 7 is provided with a number of through connection holes 10, in the shown example eight holes, for compressed air, cooling water, lubricant, electric power, or control signals as typical examples of operating or controlling media to be transferred by the swivel.

The lower connection ring 4 is provided with a corresponding number of through connection holes 11, which in the shown example open at 12 in the cylindrical periphery of the connection ring 4.

The upper connection holes 10 of the cover 7 and the lower connection holes 11 of the connection ring 4 are mutually connected by flexible or - as shown - elastically extensible hoses or cables 13 (depending on the medium to be transferred). The hose or cable 13 to the left in Fig 1 is of the spirally wound type, which is presently preferred. The hose or cable 13 to the right in Fig 1 is meant to indicate that other types of elastically extensible constructions are possible within the scope of the invention.

If the solution with ordinary flexible hoses or cables 13 is chosen, their length will determine the maximum mutual rotation between the connection ring 4 and the cover 7, normally not exceeding a full revolution.

5       The hoses or cables 13 may preferably be connected to their respective connection holes 10 and 11 by means of quick-couplings, facilitating mounting and exchange.

10       A cylindrical housing 14 for enclosing the hoses or cables 13 may be provided. Access to the hoses or cables 13 for service is very easily obtained by removal of the housing 14.

15       It may be advantageous to limit the mutual rotation in the swivel as shown and described for example to one full revolution or less, and means for this purpose may be provided.

Means for transferring media to and from the connection holes 10 and 12 are not shown, as they do not form any part of the invention.

20       When used in an industrial robot, the lower connection ring 4 of the swivel as shown and described may be stationary, whereas the shaft 1 with the base plate 2 and the cover 7 may be rotatable (less than one full revolution).